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Understanding *Udakavaha Srotomula* With Special Reference To *Viddha / Dushti Lakshana*

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ABSTRACT

Udaka is a specific term described in Ayurveda to denote the water component of the body. It represents an important constituent of *Ap Mahabhuta* and includes various bodily fluids corresponding to the aqueous fraction of the *dhatus*, such as *rasa, rakta, mamsa, meda, majja,* and *shukra*. It is also present in structures like *upadhatus* (including *stanya* and *vasa*) and *malas* (*mutra, sweda* and *dravyamsha* of *purisha*). These *apya dravyas* differ from one another based on their specific solute composition, which determines their distinct properties and physiological functions. *Srotas* are the minute channels within the body. The *mula* of *udakavaha srotas* is *talu* and *kloma*. *Talu* is considered as palate and *kloma* is an *avayava* which is widely discussed in Ayurveda. The v*iddha/dushta lakshana* of *udakavaha srotas* is *pipasa* and *sadhyomarana*. This article aims to explore the *mula sthana* of *udakavaha srotas, talu* and *kloma* from both anatomical and physiological perspective.

Key words: *Talu, Kloma, Udakavaha srotas, Viddha/Dushti lakshana.*

INTRODUCTION

तालु

- According to Shabdakalpadruma[1]

जिह्वेन्द्रियाधिष्ठानम्

It is the seat of *jihwendriya.*

- According to Apte[2]

  Palate

- According to Vaachaspatya[3]

  तालु"¦ न॰ तरन्त्यनेन वर्णाः तृ--ञुण् रस्य लः।

  The *varna* इ, च वर्ग, य and श are articulated with the help of *talu*.

  जिह्वेन्द्रियाधिष्ठाने (तेलो) स्थानभेदे।

  "मुखतस्तालुनिर्भिन्नं जिह्वा तत्रोपजायते। ततो नानारसोजज्ञे जिह्वया योऽधिगम्यते" भाग॰।

  At the separation of *mukha and talu, Jihwa* gets originated which is responsible for varied taste perception.

  "निर्भिन्नंतालु वरुणो लोकपालोऽविशद्धरेः।

  Varuna is the devata of *talu*.

क्लोम

- According to Shabdakalpadruma[4]

  क्लुङ् गतौ + मनिन् ।

  फुप्फुसम् । फोफडा इति फुलधरा इति च ख्यातम्। इति भरतः ।

  Kloma is also known as *phupphusa, phophada* and *phuladhara*.

  बाह्वोर्द्वोर्योर्मध्यो वक्षः तन्मध्ये हृदयं तत्पर्श्वे क्लोम पिपासास्थानम् । इति वैद्यकम्

  Vaksha is situated in between the two *bahus*, middle of which *hrudaya* is present, adjacent to the *hrudaya* is *kloma which* is a *pipasasthanam*.

- According to Vaachaspatya[5]

  क्लोमन्"¦ न॰ क्लुगतौ मनिन्।

  The word proper is *kloman* but,

  सर्व्वे नान्ता अदन्ताः स्युरित्युक्तेक्लोममप्यत्र भरतः।

  According to Bharata where ever a *Shabda* ends with न *kara*, न् should be replaced with अ. Here *kloma* is one such example and thus pronounced as *kloma*.

  हृदयस्याधोभागे दक्षिणकुक्षिस्थे मांसपिण्डाकारे पदार्थे

  तस्याधोवामतः प्लीहाफुप्फुसश्च दक्षिणतो यकृत् क्लोम सुश्रुतः।[6]

  kloma is present below the heart in the right *kukṣhi* which resembles a *mamsapinda aakara*. *Pleeha* and *Phupphusa* are located below and to the left of the heart, whereas *Yakṛut* and *Kloma* are located below and to the right of the heart.

  वपावसावहननं नाभिः क्लाम यकृत् प्लिहा" या॰। अवहनन फुप्फुषः प्लीहा आयुर्वेदप्रसिद्धः तौ च

  मांसपिण्डाकारौसव्यकुक्षिगतौ। यकृत् कालकं, क्लाम मांसपिण्डस्तौ चदक्षिणकुक्षिगतौ मिता॰।

  Here *vapa, vasaa, avahanana, nabhi, klaama, yakrut* and *pleeha* are enumerated. *Avahanana* is *Phupphusha*, *Pleeha* is a well-known entity in ayurveda and they both resemble *mamsapinda aakara and* located in left *kukṣhi*. *Yakrut* is also known as *kaalakam* and *klaama* is *mamsapinda* both are situated in right *kukshi*.

"वृक्कयोः प्लीह्नि यकृति हृदयक्लोम्नि वा तथा। श्वासो यकृति तृष्णा च पिपासाक्लोमजेऽधिका। [7]

In the context of *Viddradhi* acharya Sushruta explains *Vrukka, pleeha, yakrut, hrudaya, kloma* are the seat of *abhyantara vidradhi*. When *vidradhi* affects the *yakrut*, it manifests as *swasa* and *trushna*, whereas its involvement in *kloma* results in *adhika pipasa*.

नाडीषु हृदयक्लोमनिबद्धास्वष्टादश" कण्ठहृदयनेत्रक्लोमनाडीषु मण्डलाः" [8]

Achary Sushruta in shareera sthana explains *Nadi* which are associated with *hrudaya* and *kloma* are 18 in number. *Mandala sandhi* is present in *kantha, hrudaya, netra* and *klomanadi*.

शुष्कक्लोमगलाननः" इति च सुश्रुतः।[9]

In *Shoshapratisheda adhyaya* acharya Sushruta describes when *shosha* occurs due to excessive walking, result in dryness of the *kloma, gala* and *aanana*.

क्लोम च पिपासास्थानमिति वैद्यकम्।

Kloma is the seat of thirst.

यकृत् क्लोमानं वरुणोभिषज्यन्" यजु°

Varuna is the devata of *yakrut* and *kloma*.

- According to amarakosha[10]

Tilakam, kloma. Region where the fluid or water is found.

Udaryajalashaya. (Reservoir of water in the *udara*)

LOCATION OF *KLOMA*

According to Sushruta;

- *Tasyadho vamataha pleeha phuphusashcha; dakshinato yakrut kloma.*[11]

Pleeha and *Phupphusa* are located below and to the left of the *Hrudaya*, whereas *Yakṛut* and *Kloma* are located below and to the right of the *Hrudaya*.

According to Ashtanga Hrudaya;

- *Tasya dakshinataha kloma yakrutphuphusamaasthitam.*[12]

In the context of enumerating *koshtangas* commentary explains *kloma*, *yakrut* and *phupphusa* are situated to the right of *hrudaya*.

- *Kloma udakavahisrotomulam, hrutdakshinato mamsagranthi*.[13]

In the context of explaining *kapha sthana*, the commentator Hemadri explains *kloma* as the *mula sthana* of*udakavaha srotas* which is located to the right of *hrudaya* and is in the form of *mamsagranthi*.

According to Sharangadhara;

- *Tilam tu shonitakittaprabhavam Dakshinasritam yakritsameepe klomasamjakam bhavati.*[14]

Tila is derived from *shonitakitta* and is located to the right of *hrudaya* near *yakrut*. It is also known as *kloma*.

UDAKAVAHA SROTAS

Srotas are the micro and macro passages of the body, which helps in transportation of transforming substances from one part of the body to the other. Acharya Sushruta and Charaka have explained *udakavaha srotas* in detail,

MULASTHANA

- उदकवहानां स्रोतसां तालुमूलं क्लोम च [15]
- उदकवहे द्वे, तयोर्मूलं तालु क्लोम च [16]

Mula sthana of *udakavaha srotas* is *talu* and *kloma*.

SROTODUSHTI LAKSHANA

प्रदुष्टानां तु खल्वेषामिदं विशेषविज्ञानं भवति; तद्यथा- जिह्वाताल्वोष्ठकण्ठक्लोमशोषं पिपासां चातिप्रवृद्धां दृष्ट्वोदकवहान्यस्य स्रोतांसि प्रदुष्टानीति विद्यात्। [17]

Vitiation of *udakavaha srotas* lead to *shosha* of *jihwa, talu, oshta, kantha, kloma* and excessive thirst.

VIDDHA LAKSHANA

- तत्र विद्धस्य पिपासा सद्योमरणं च [18]

Viddha lakshana of *udakavaha srotas* is *pipasa* and *saddhyomarana*.

Water is the most abundant constituent in the body, accounting for 50% of body weight in women and 60% in men. Total body water is distributed in two major compartments; intracellular and extra cellular. The major ECF particles are Na^+ and its accompanying anions chloride and bicarbonate, whereas potassium and phosphate are the predominant ICF osmoles[19]. The relative consistency of the body fluids is remarkable because there is continuous exchange of fluid and solutes with the external environment as well as within the different compartments of the body. So, maintenance of a relatively constant volume and a stable composition of the body fluid is essential for homeostasis.

DISCUSSION

- *Udaka* refers to the water content of the body and includes *jala, sweda, and lasika*[20]. Acharya Charaka has described first *twacha* as *udakadhara twacha*[21], emphasizing its role in maintaining body water. The importance of *udaka* becomes clinically evident during dehydration, where assessment of skin moisture through palpation reflects the status of body water. The *parama utkrishta pramana* of *udaka* is described as Ten *Anjali*[22], indicating the total quantity of water present in the body. When it gets depleted, it results in *trushna roga* and excess *udaka* is eliminated through *purisha* and *mutra*[23].

- The *mula sthana* of *udakavaha srotas* is *talu* and *kloma*. *Talu* refers to the palate, while the identity of *kloma* is widely discussed. Both entities are regulated by *Varuna deva*. In the Susruta Samhita, Varuna is described as *Adhidhaivata* of *ap mahaboota*[24]. The primary function of *udakavaha srotas* is related to fluid balance mechanism of the body. Hence, all these entities are related to fluid mechanism in the body. The *mula sthana* is regarded as the *udbhava sthana*, *Prabhava sthana* or *chikitsa sthana*. Thirst is initially perceived as dryness in the *jihwamula*, *gala*, *talu* and *kloma*[25]. Here *kloma* is considered as both *udbhava* and *abhivyakthi sthana*.

- The *viddha lakshana* of *udakavaha srotas* includes *pipasa* and *sadhyomarana*, indicating that the range of *pipasa* can be from mild to severe. Initially, an individual experiences dryness of mouth, tongue, and if thirst is not quenched, it may progress to excessive thirst, in extreme cases, it can lead to a life-threatening stage resulting in death.

Pipasa; word meaning

- According to Shabdakalpadruma[26]

  पिपासा, स्त्री, (पातुमिच्छेति । पा + सन् + अः । ततष्टाप् ।) पानेच्छा । तत्पर्य्यायः । तृष्णा

- According to Apte[27]

  Thirst

- According to Vaachaspatya[28]

  तृषा महत्या परिशुष्कतालवः

Excessive thirst leads to complete dryness of *talu*.

Pipasa/*thrushna* and its *prakaara*?

तृष् धातु – पिपासायां[29]

तृष्यति पातुं इच्छति इति तृष्णा

Pipasa refers to the sensation or physiological state that signals the need for fluid intake, whereas *trushna* is considered as *swatantra roga* or *upadrava* of some other *roga*. It indicates a loss of body fluids and an increased demand for replenishment, which may arise due to endogenous or exogenous causes, resulting in morbid thirst. The *swabhava*[30] of *Trushna* is such that, although the patient frequently consumes water, the thirst remains unquenched. It may arise as a complication of severe diseases or may render an individual weak. The doshas involved are aggravated *Pitta* and *Vata*[31], owing to the *ushna guna* of *Pitta* and the *ruksha guna* of *Vata*. Due to *Nidana sevana*, *vatadushti* occurs, leading to *shosha* of *dehasthitha aap dhatu* (*rasadirupa*)[32], which is primarily reflected in the *twacha* due to loss of *twaksara purusha lakshana*. According to Acharya Charaka, *Trushna* is classified into five types: *Vataja, Pittaja, Aamaja, Kshayaja*, and

Upasargaja[33]. According to Acharya Sushruta, *Trushna* is classified into seven types: *Vataja, Pittaja, Kaphaja, Kshataja, Kshayaja, Aamaja,* and *Bhaktodbhava*[34]. The first and foremost symptom of *trushna* is *mukha shosha*[35].

Which among these 5 *trushna* is life threatening?

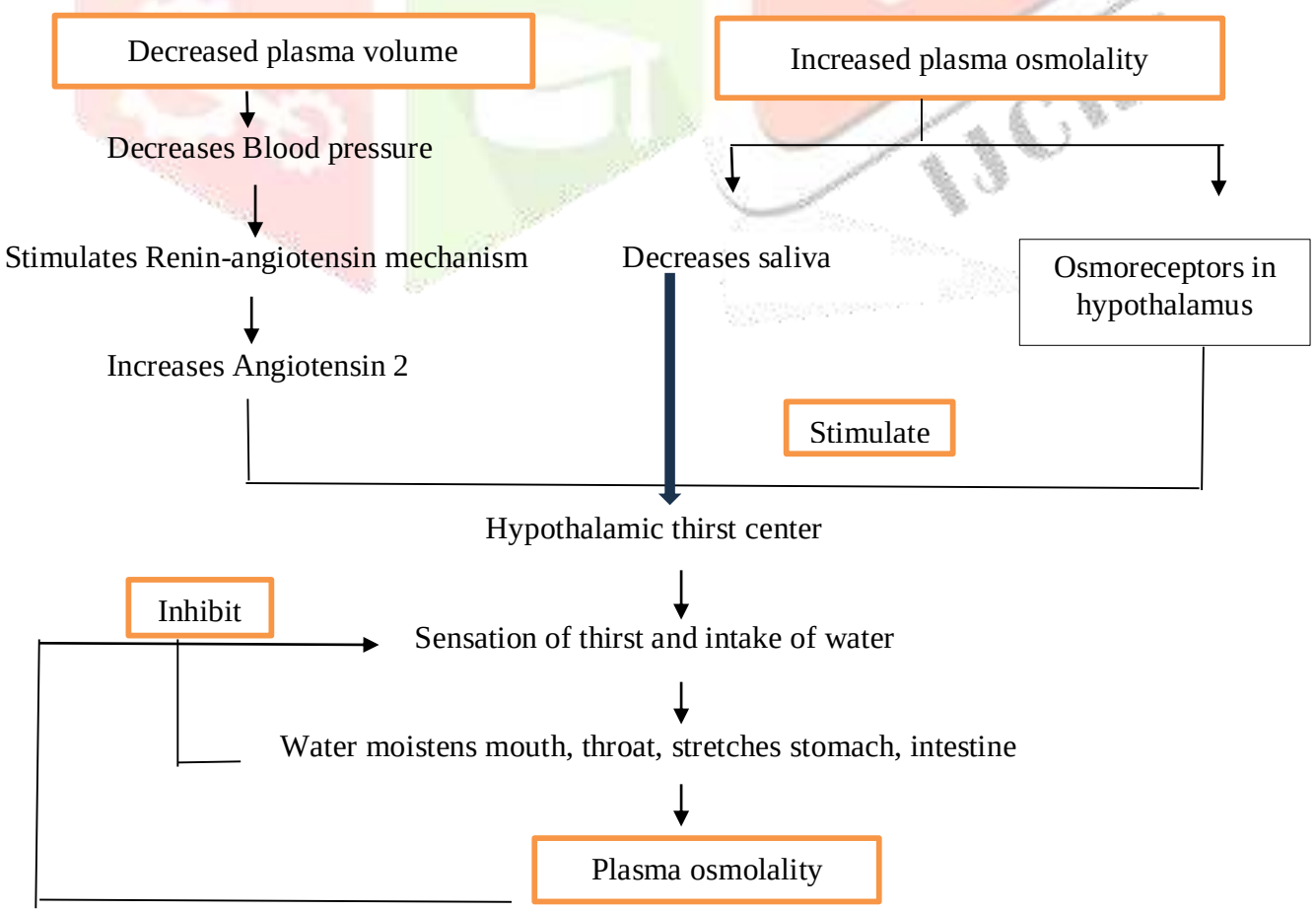
सर्वास्त्वतिप्रसक्ता रोगकृशानां वमिप्रसक्तानाम्|

घोरोपद्रवयुक्तास्तृणा मरणाय विज्ञेयाः||[36]

Among the 5 types of *trushna*, if any type occurs in a person who is chronically ill and weak, having repeated vomiting, severe *trushna vega* or associated with *upadrava*, it may result in *marana*.

Why it is life-threatening and what is the mechanism?[37]

Thirst is an early physiological response to depletion of body water and serves as a protective mechanism to maintain fluid homeostasis. Initially, reduced water intake or excessive fluid loss leads to dehydration, which manifests as dryness of the mouth, skin, and mucous membranes. Persistent dehydration results in a progressive decline in intravascular volume, leading to hypovolemia. If fluid loss continues without adequate correction, compensatory mechanisms fail, resulting in decreased tissue perfusion and ultimately progressing to hypovolemic shock.



- Osmoreceptors in hypothalamus stimulates the release of ADH ⟶ water reabsorption in collecting duct of kidney.
- Decreased sodium or increased potassium concentration and renin-angiotensin mechanism stimulates adrenal cortex ⟶ release of aldosterone. Thereby sodium reabsorption and potassium excretion.

Who are the members involved?

Stimuli - ↑ Osmolality, ↓ plasma Volume

Receptors - Osmoreceptors, Baroreceptors

Centre - Hypothalamic thirst centre

Hormones - ADH, Angiotensin II, Aldosterone

Effectors - Kidneys, Salivary glands

Where can be *kloma* fixed?

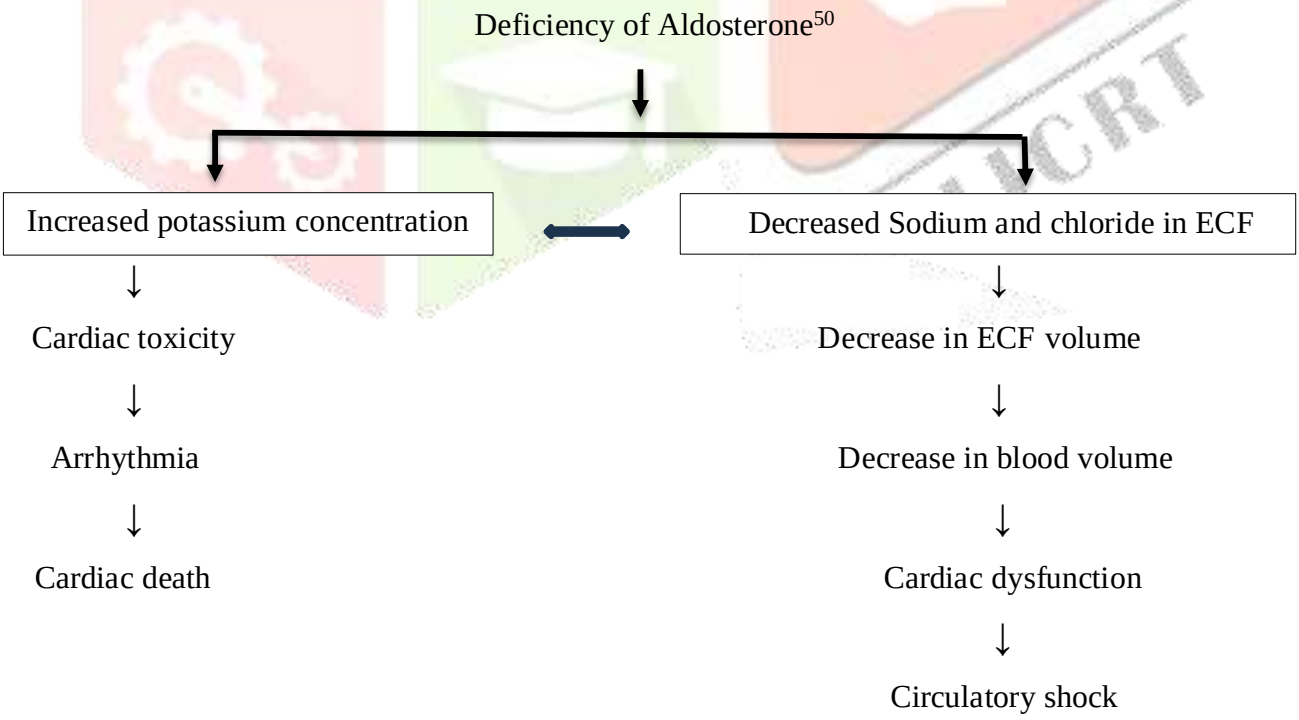
- *Kloma* is an *avayava* which is present below and to the right of heart, situated in the *kukshi* and resembles *mamsapindakaara*. It is considered as *pipasa sthana* and primary function is to pacify *trushna*. As it is a *pipasa sthana*, it plays an important role in regulation of fluid balance in our body.
- *Kloma* as *phupphusa*; *Phupphusa* is an *avayava* situated in the *koshta*, located below and to the left of the *hrudaya* along with *pleeha*[38]. It may be considered as *adho* and *vamataha* to *hrudaya* or *kevala vamataha* to *hrudaya*. The second option may be appropriate because it is derived from *shonita phena* and serves as the *aadhara* of *udanavayu*[39]. The function of *udanavata* include *vaak pravruti*, *prayatna*, *oorja*, *bala*, *varna* and *smriti*[40].
- *Kloma* as *koshtanga*; Acharya Caraka[41], Vagbhata[42], Kashyapa[43] and Bhela[44] enumerate *kloma* among *koshtangas*. Every structure in our body has its specific location and position. These structures are situated in spaces formed from *akasha mahabhuta*. Areas where *Avayava* are present are termed as *koshta*. However, acharya Sushruta not enumerated *kloma* among the *koshtangas*.
- *Tilakam* is mentioned as the *paryaya* of *kloma*[45]. The shape of pancreas is considered similar to that of the *tilakam*. The main function of pancreas is secretion of digestive enzymes and regulation of blood glucose level. Diabetic ketoacidosis is a life-threatening complication of diabetes, characterized by the accumulation of ketones and lactic acid in the blood, along with significant loss of electrolytes and water through urine. This leads to dehydration, hypovolemia and shock. Although the pancreas does not directly regulate fluid balance, it can significantly disrupt fluid and electrolyte homeostasis in pathological conditions such as acute pancreatitis and uncontrolled diabetes mellitus.
- *Kloma* as *swasanalika*; Acharya Gananath Sen considered *kloma* as *swasanalika* (trachea)[46]. Trachea is a 10 – 11 cm long tube formed of cartilage and fibromuscular membrane, and lined internally by mucosa. The anterolateral portion of the trachea consist of 16 – 20 superimposed incomplete rings of hyaline cartilage and intervening fibroelastic tissue[47]. Because of the presence of *mandala Sandhi* acharya considered it as *kloma*.
- Is *Kloma* and Hypothalamus inter related?

The hypothalamus acts as a major regulatory centre and is primarily stimulated during alterations in fluid balance, body temperature and other homeostatic function. Being a part of CNS, it plays a crucial role in the regulation of fluid and electrolyte balance. *Kloma* as a *koshtanga* is therefore probably linked to the hypothalamus in this regulatory mechanism of thirst, because physiologically hypothalamus is the thirst centre signifying its role as one of the important contributary factor for manifestation of thirst or *pipasa*.

- Is *Kloma* and Suprarenal gland inter related?

Suprarenal glands lie immediately superior and slightly anterior to the upper pole of kidney. Each gland possesses an outer cortex and inner medulla. Cortical cells produce several hormones such as cells in zona glomerulosa produce mineralocorticoids, eg aldosterone, which regulates water and electrolyte balance. Cells in zona fasciculate produce hormones maintaining carbohydrate balance(glucocorticoid) eg cortisol; cells in zona reticularis produce sex hormones. The supra renal cortex is essential to life and its complete removal is lethal without replacement therapy[48].

Aldosterone is very essential for life and it maintains the osmolarity and volume of ECF. It is usually called life-saving hormone. Because, its absence causes death within 3 days to 2 weeks[49]. The secretion of aldosterone is regulated by an increase in potassium concentration in the extracellular fluid, a decrease in sodium concentration, and a reduction in ECF volume. It acts on the distal convoluted tubule and collecting duct of kidney to increase sodium reabsorption and potassium excretion, thereby restoring normal fluid and electrolyte balance. Deficiency of this hormone can lead to a range of symptoms, from mild to severe. Early symptoms include hypotension, excessive sweating, and diarrhoea. In extreme cases, it may result in death.



CONCLUSION

The *mulasthana* of *Udakavaha* srotas is described as *Talu* and *Kloma*. *Viddha*/ *duṣhṭi lakṣaṇas* include *pipasa* and *sadyomaraṇa*. ***Talu*** is considered as the **palate**, where the first symptom of thirst is perceived. *Kloma* is extensively discussed in classical texts, and various interpretations exist regarding its anatomical and functional identity. Both are regulated by Varuna deva, implying all these are related to water/fluid mechanism in the body. Madhukosha commentary on Madava Nidana clarifies that *Kloma* is situated above the *vṛukka* and is identified as the *pipasa-sthana*[51]. From a functional perspective, regulation of thirst and maintenance of fluid balance are central to this concept. In contemporary physiology, the hypothalamus acts as the primary thirst centre, regulating water intake and fluid homeostasis, while the suprarenal (adrenal) glands, particularly through aldosterone secretion, play a vital role in maintaining sodium and water balance. In conditions like aldosterone deficiency, symptoms range from hypotension and dehydration to potentially fatal outcomes. Since *Kloma* is described as an *avayava* located in the *kukshi*, resembling a *mamsa-piṇḍakara* structure, and its function is associated with *trushna aachadana*, these anatomical and physiological observations support the view that ***Kloma*** may represent the **Suprarenal gland**. Understanding *kloma* in this light provides deeper insight into its function, pathology, and diagnostic relevance, offering better clarity on its role in health and disease.

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